



## **SMHI Ulrika Willén**

Water vapor (TCWV) issues:

- \* Large values in the time series, also noted by DLR – Probably lack of data for some regions. Need to sample the models in time & space for monthly means – Use a simple simulator
  - \* Non physical jumps in the regional and global TCWV timeseries cf ERA5. Why?...
  - \* Land Surface Temperature (LST) some jumps especially in the global timeseries
- Due to stability problems in the multi-sensor product MW (Lizzie Good), we will concentrate on looking at variability and extremes not trends

## **DMI+ Ruth Mottram**

- \* PolarRes simulations 4 of 6 are ready, some post processing remains.
- \* Additional plan: to get a better agreement for SEC (Surface Elevation Change) include ESA CCI ice sheet Ice Velocity (IV) in the regional models SMB (Surface Mass balance) for GrIS and AIS

# WP5.7 TCWV timeseries “spikes”



SMHI: ERA5 & CCI MERIS, MODIS-TERRA, OLCI 0.5deg Water Vapour over Greenland

TCWV unrealistic large values - spikes

DLR Lisa & Axel also see it

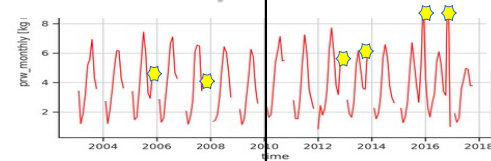
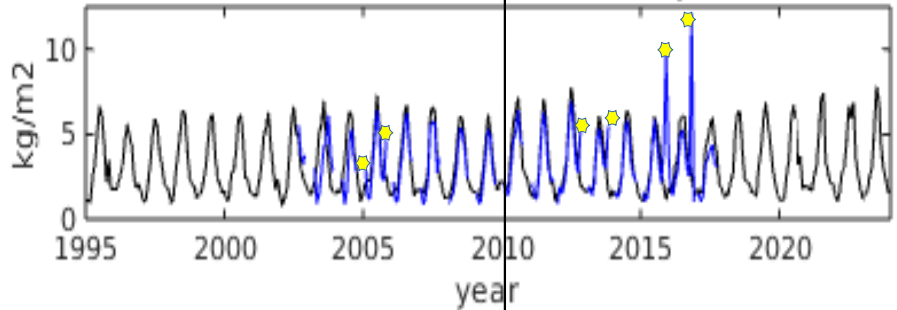
Why?

Missing data certain regions (small number of grid cells with valid data) affecting the monthly and daily means

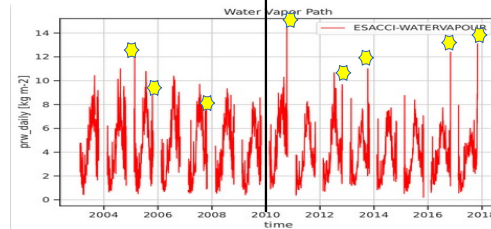
Solution: Sample the model data in time and space as the satellite - Simple simulator

Contact the CCI TCWV team for feedback

### GrIS Total Column Water Vapour



DLR monthly

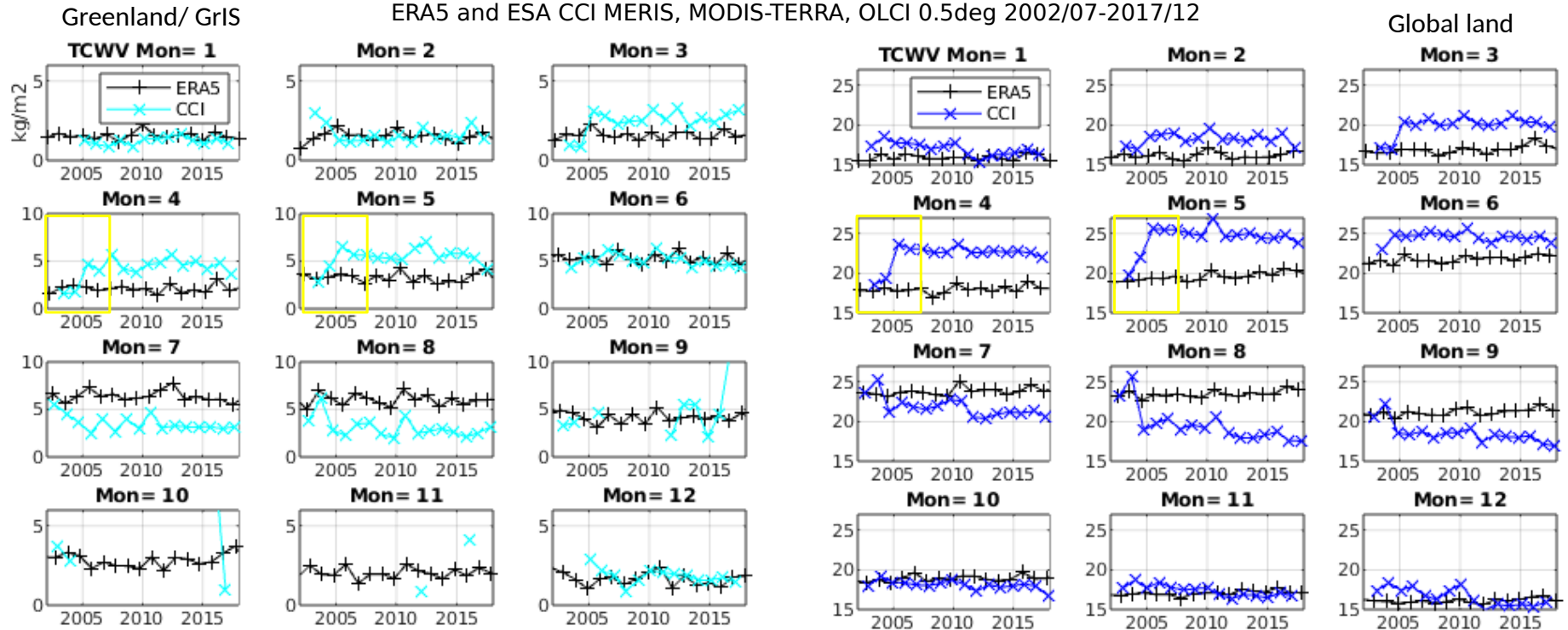


DLR daily

DLR: monthly and Daily CCI Water Vapour over Greenland

# WP5.7 TCWV timeseries “jump”

CCI non physical “jumps” of ERA5 in the regional and global TCWV timeseries – Why?  
Could it also be due to sampling (or my analysis...)?  
Or inconsistency between the different satellites in the combined records...?



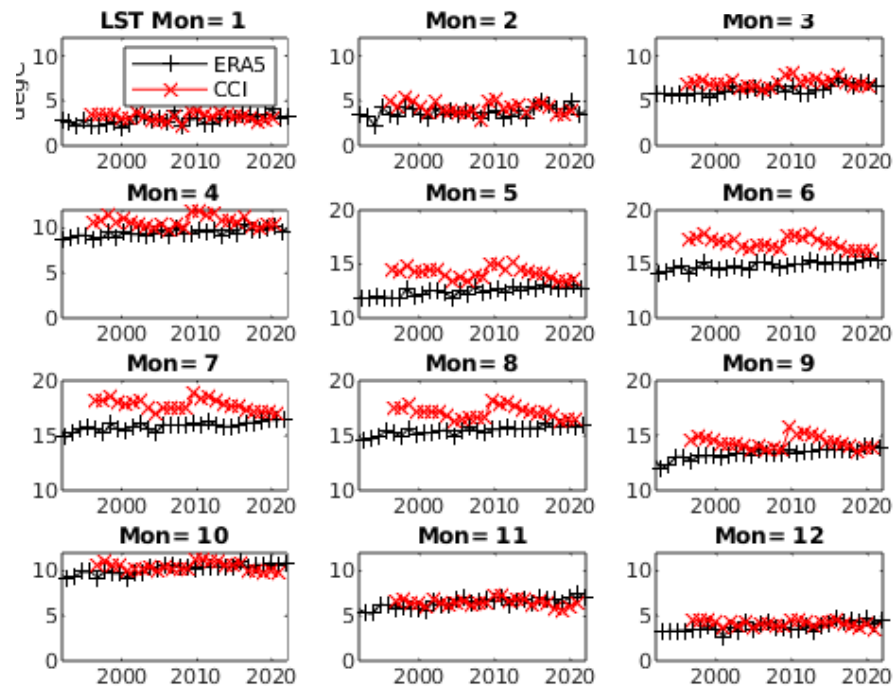
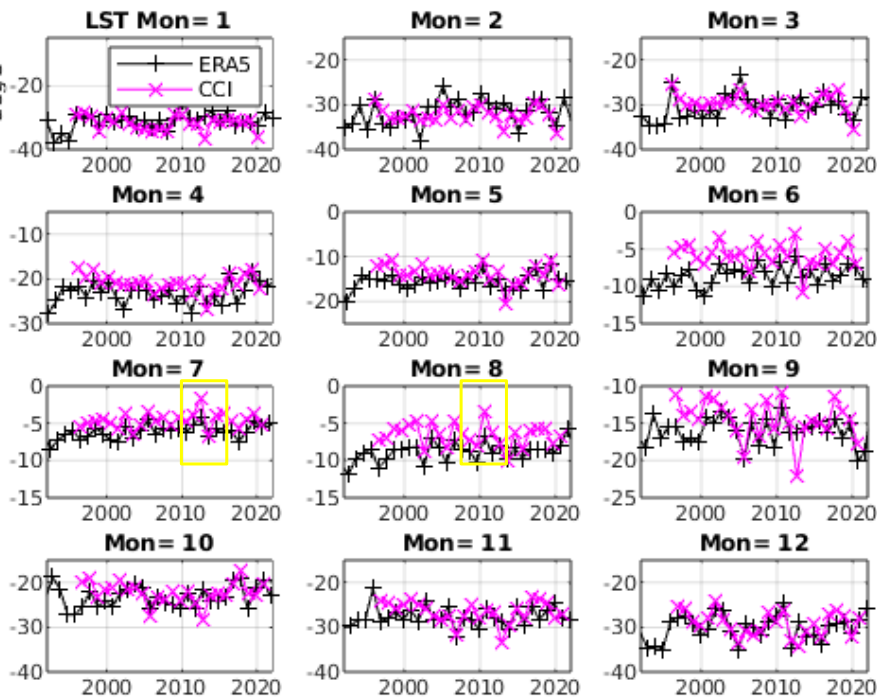
# WP5.7 Land Surface Temperature (LST) time series

Greenland: Multi sensor data not stable (Lizzie Good) - Look at extremes e.g. Summer 2012

Globally: Some jumps - due to sensor or geographical differences? - Check 2D ERA5 & satellite

Greenland/ GrIS

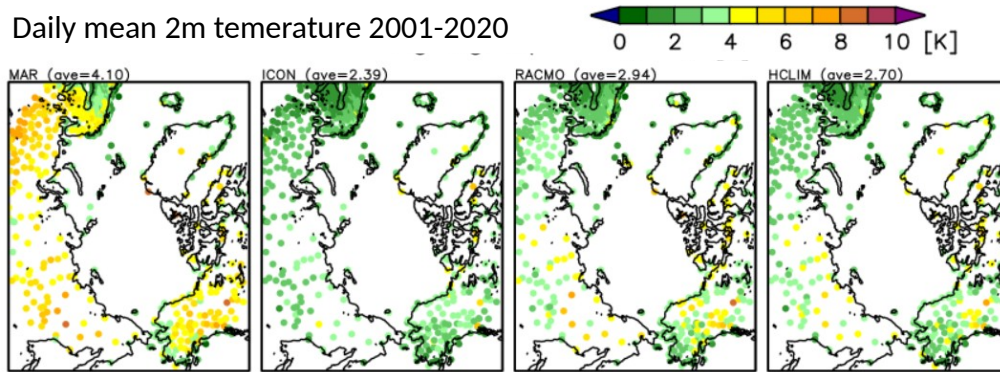
ERA5 and Satellite data: ESA CCI MERIS, MODIS-TERRA, OLCI 0.5deg 2002/07-2017/12



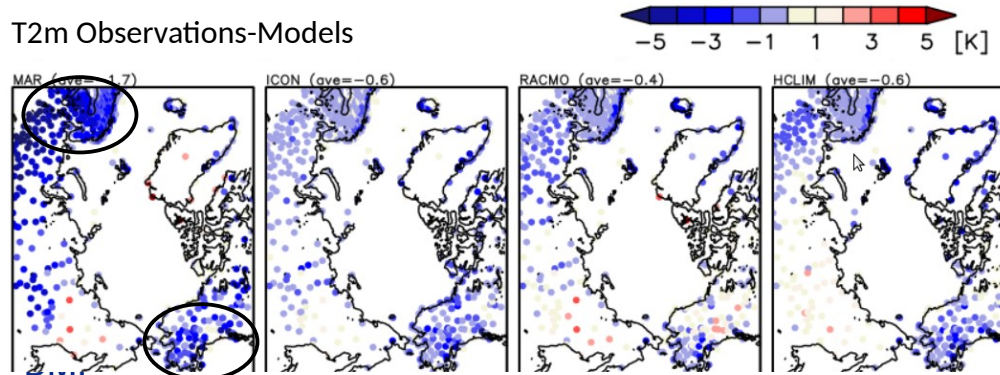
# DMI PolarRES: High resolution ensemble of climate models for both polar regions run for present day and GCM projections

Slide 5

Daily mean 2m temperature 2001-2020



T2m Observations-Models



## Models

6 regional climate models: MAR, ICON, RACMO, HCLIM, (MetUM, WRF)

Arctic and Antarctic domains at 12km resolution

- 20 year hindcast (2001-2020 with ERA-5)
- 100 year projections with 2 GCM storylines/scenarios for each polar region

- **Figures** Models T2m mean and bias
- Observations (GHCN)
- Models warmer than observed
- MAR +2K, other +0.5K - good enough ...

Figures from Ruth Mottram/Heidrun Matthes

# CMUG/PolarRES case study: Ice Sheet ESA CCI SEC cf to model outputs

Slide 6

Surface Elevation Change (SEC) for 5 different timeperiods:

1992-1997, 1997-2002, 2002-2007, 2007-2012, 2012-2017

Top Row ESA CCI SEC, Bottom Row HIRHAM SMB

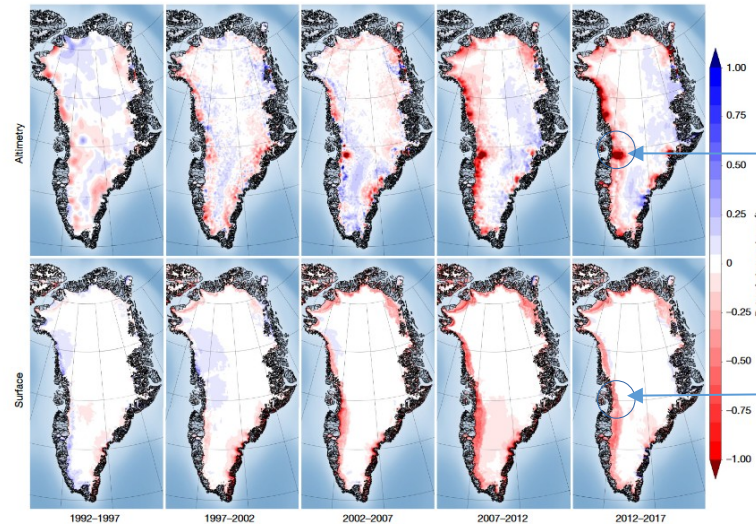


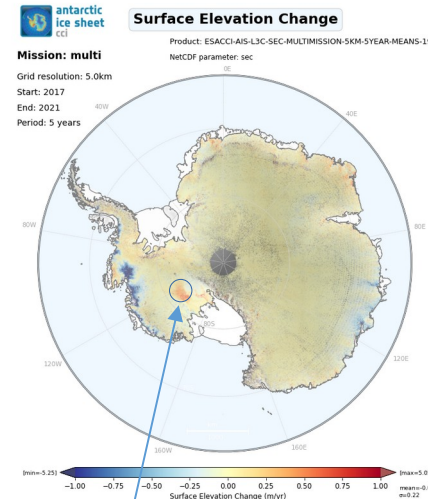
Fig. 11 Greenland ice sheet elevation change. Rate of elevation change of the Greenland Ice Sheet determined from ERS, ENVISAT and CryoSat-2 satellite radar altimetry (top row) and from the HIRHAMs SMB model (ice equivalent; bottom row) over successive 5-yr epochs. Data from ref. 29.

From Shepherd et al., 2019

1. Observations: Ice sheet dynamics cause ice sheet thinning

2. SMB model lack dynamics  
Plan use CCI Ice Velocity (IV) in the SMB model

Surface Elevation Change (SEC) for 2017-2021



3. Ice dynamics cause thickening (slowdown of ice stream)  
Opposite colors for AIS cf GrIS

Figures from Ruth Mottram